

A. Lesson Context

BIG PICTURE of this UNIT:	<ul style="list-style-type: none"> • How & why do we build NEW knowledge in Mathematics? • What NEW IDEAS & NEW CONCEPTS can we now explore with specific references to QUADRATIC FUNCTIONS? • How can we extend our knowledge of FUNCTIONS, given our BASIC understanding of Functions? 		
CONTEXT of this LESSON:	Where we've been You been introduced to another method of finding zeroes → using the completing the square strategy	Where we are NOW we will focus on EXTENDING the idea of completing the square to find the VERTEX	Where we are heading How do we extend our knowledge & skills of the algebra of quadratic functions, and build in new ideas & concepts involving functions.

B. Lesson Objectives

- Understand the completing the square method as a strategies that can be applied to finding the vertex of quadratic functions in standard form.
- Extend this method to converting standard form equation into vertex form

C. Skills Review

Solve using the c/s strategy $x^2 - 10x + 22 = 0$

Find the vertex of the parabola $f(x) = x^2 - 10x + 22$

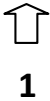
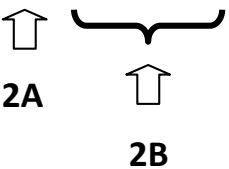
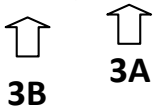

Solve using the c/s strategy $m^2 - 9m - 4 = 3$

Find the vertex of the parabola $P(m) = m^2 - 9m - 7$


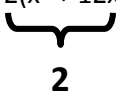
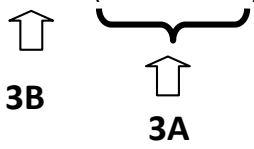
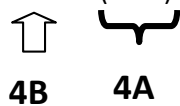

Solve using the c/s strategy $2x^2 + 12x = 17$

Find the vertex of the parabola $g(x) = 2x^2 + 12x - 17$

D. Skill Application – Completing the Square → a = 1

Example #1: Convert the equation $f(x) = x^2 + 8x + 15$ from standard form to vertex form.	Why Did I Do That???
$f(x) = x^2 + 8x + 15$	
STEP 1: $f(x) - 15 = x^2 + 8x$ 	STEP 1 → Why is there a - 15 on the left side?
STEP 2: $f(x) - 15 + 16 = x^2 + 8x + 16$ 	STEP 2A → Why is there a + 16 on the left side now? STEP 2B → Why is there a + 16 on the right side?
STEP 3: $f(x) + 1 = (x + 4)^2$ 	STEP 3A → Where did the $(x + 4)^2$ come from? STEP 3B → Where did the +1 come from?
STEP 4: $f(x) = (x + 4)^2 - 1$ 	STEP 4 → Where did the - 1 come from?
Practice #1: Convert the equation $f(x) = x^2 - 10x + 15$ from standard form to vertex form.	Practice #2: Identify the transformations of $f(x) = x^2$ if the “new” equation is $f(x) = x^2 - 7x + 2$.
EXTENSION: Are there another ways that I can work out the vertex form of an equation if I am given the standard form (i.e ways that DON'T involve the completing the square method?)	

E. Skill Application – Completing the Square → a ≠ 1

Example #1: Convert the equation $f(x) = 2x^2 + 24x + 15$ from standard form to vertex form.	Why Did I Do That????
STEP 1: $f(x) - 15 = 2x^2 + 24x$ 	STEP 1 → Why is there a - 15 on the left side?
STEP 2: $f(x) - 15 = 2(x^2 + 12x)$ 	STEP 2 → Where did the 2 & 12 come from?
STEP 2: $f(x) - 15 + 72 = 2(x^2 + 12x + 36)$ 	STEP 3A → Why is there a +36 here now? STEP 3B → Why is there a -72 also included?
STEP 4: $f(x) - 57 = 2(x + 6)^2$ 	STEP 4A → Where did the $(x + 6)^2$ come from? STEP 4B → Where did the - 57 come from?
STEP 5: $f(x) = 2(x + 6)^2 + 57$ 	STEP 5 → Where did the +57 come from?
Practice #1: Convert the equation $f(x) = \frac{1}{2}x^2 - 2x + 3$ from standard form to vertex form.	